

REMARKS / ARGUMENTS

Applicants respectfully request reconsideration and allowance in view of the following remarks. In the Office Action, mailed February 25, 2008, the Examiner rejected claims 1, 2, 6, 10-13, 15, 17, 19, 21-26, 29, 32-36 and 39-52. By this response, no claims have been added, deleted or amended. Following entry of this response, claims 1-52 will be pending in the application.

Allowable Subject Matter

Initially, Applicants thank the Examiner for the indication that claims 3-5, 7-9, 14, 16, 18, 20, 27-28, 30-31 and 37-38 contain allowable subject matter, and would be allowed if rewritten in independent form. Applicants have not rewritten these claims in independent form at this time, as the entire application is believed to be in a condition for allowance, for at least the reasons set forth below.

Claim Objections

Claim 46 was objected to for allegedly failing to define the variable R that appears therein. Applicants respectfully submit that claim 46 clearly defines R as a dimension of a spatial filter matrix, inasmuch as claim 46 recites that “each spatial filter matrix has a dimension of N by R.” Reconsideration and withdrawal of this rejection are respectfully requested.

Claim Rejection

Claims 1-2, 6, 10, 12, 15, 17, 19, 21, 24-25, 29, 32-33, 35-36, 40-42 and 45-52 were rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,711,124 (“Khayrallah”); claims 11 and 13 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Khayrallah; and claims 22-23 and 43-44 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Khayrallah in view of U.S. Patent No. 7,020,490 (“Khatri”). Reconsideration and withdrawal of these rejections are respectfully requested.

The cited references are not seen to disclose or suggest, alone or in any combination, the features of the claimed invention, particularly with respect to at least the features of (i) “selecting at least one different combination of scalars, each combination including at least one scalar for at least one row of the base matrix, one scalar per row” and “forming at least one steering matrix by multiplying the base matrix with the at least one different combination of scalars” as recited in independent claims 1 and 17, or (ii) “the plurality of steering matrices are generated based on a

base matrix and at least one different combination of scalars, each combination including at least one scalar used to multiply at least one row of the base matrix to generate a corresponding steering matrix,” as recited in independent claims 21, 34, 39, 42, 47, and 50.

Khayrallah is seen to be generally directed to channel estimation in a wireless communication system. Khayrallah discloses a scaling value matrix, each element of which comprises a scaling value that is used to scale the transmit power level of a training sequence. *See*, Khayrallah, FIG. 3, col. 5, ll. 26-31. The matrix element in the k^{th} row and the j^{th} column represents the scaling value used to scale the transmit signal power and set the signal sign (positive or negative) for the training sequence portion of the transmit signal from the j^{th} antenna during the k^{th} time slot. *See*, Khayrallah, col. 5, ll. 44-48. Thus, during Slot 1, the transmit signal from antenna A_1 for at least the training sequence portion of the signal is scaled according to matrix element b_{11} , the signal from antenna A_2 is scaled according to matrix element b_{12} and so on. *See*, Khayrallah, col. 5, ll. 54-57. The training sequence, which is part of a transmit signal, is known information that is transmitted along with unknown information such as control and data. *See*, Khayrallah, col. 4, ll. 2-6. Accordingly, the training sequence of Khayrallah is not a base matrix, as asserted in the Office Action.

By way of illustration, and without limiting the scope of the claims, Applicants disclose one or more steering matrices (or transmit matrices) that are formed by multiplying a base matrix with at least one scalar. A base matrix may be, for example, a Walsh matrix, a Fourier matrix, or some other unitary matrix having orthogonal columns. *See, e.g.*, Application, ¶ [0008], Equation (3) at ¶ [0023], and Equation (5) at ¶ [0028]. A scalar may be, for example, +1, -1, +j, -j, $e^{j\pi}$, $e^{j\pi/2}$, $e^{-j\pi/2}$, $e^{j3\pi/4}$, $e^{-j\pi/4}$, $e^{j\pi/8}$, $e^{-j2\pi/3}$, $e^{j\pi/3}$, $e^{-j\pi/6}$, *etc.* *See, e.g.*, Application, ¶¶ [0024], [0029] and [0030]. One scalar is applied to at least one row of the base matrix to generate a steering matrix. *See, e.g.*, Application, ¶ [0024], [0025], [0029] and [0030]. Different steering matrices may be generated using different scalars. *See, e.g.*, Application, ¶¶ [0024], [0026] and [0029].

While Khayrallah discloses a scaling value matrix, it does not disclose how this matrix is formed, let alone that a steering matrix is formed by multiplying at least one scalar with at least one row of a base matrix. Even assuming, *arguendo*, that the training sequence of Khayrallah were a base matrix, Khayrallah would still not disclose or suggest applying one scalar to one entire row of a base matrix. Khayrallah applies one scaling value of a given row and column to

one corresponding training sequence portion at the given row and column. In Khayrallah, a scaling value at k^{th} row and j^{th} column is applied to its corresponding one training sequence portion of the transmit signal from the j^{th} antenna during the k^{th} time slot. Accordingly, a scaling value at k^{th} row and j^{th} column is not applied to the training sequence from all of the antennas during the k^{th} time slot. In other words, one scaling value is not applied to one row of a training sequence; but rather one scaling value at k^{th} row and j^{th} column is used for only one training sequence portion at k^{th} row and j^{th} column.

Accordingly, Khayrallah is not seen to disclose, or even to suggest, the features of the claimed invention, particularly with respect to at least the features of (i) “selecting at least one different combination of scalars, each combination including at least one scalar for at least one row of the base matrix, one scalar per row” and “forming at least one steering matrix by multiplying the base matrix with the at least one different combination of scalars” as recited in independent claims 1 and 17, or (ii) “the plurality of steering matrices are generated based on a base matrix and at least one different combination of scalars, each combination including at least one scalar used to multiply at least one row of the base matrix to generate a corresponding steering matrix,” as recited in independent claims 21, 34, 39, 42, 47, and 50.

Khatri, which was used in the rejection of certain dependent claims, is not seen to remedy the foregoing deficiencies of Khayrallah. Khatri is seen to be generally directed to a MIMO radio system, which may communicate using orthogonal frequency division multiplexing. *See* Khatri, col. 4, ll. 50-56. Nowhere is Khatri seen to disclose or suggest the foregoing features of the claimed invention. Accordingly, Khayrallah and Khatri, whether taken alone or in combination, are not seen to disclose or suggest the features of independent claims 1, 17, 21, 34, 39, 42, 47, and 50, particularly with respect to at least the features of (i) “selecting at least one different combination of scalars, each combination including at least one scalar for at least one row of the base matrix, one scalar per row” and “forming at least one steering matrix by multiplying the base matrix with the at least one different combination of scalars” as recited in independent claims 1 and 17, or (ii) “the plurality of steering matrices are generated based on a base matrix and at least one different combination of scalars, each combination including at least one scalar used to multiply at least one row of the base matrix to generate a corresponding steering matrix,” as recited in independent claims 21, 34, 39, 42, 47, and 50.

The other rejected claims currently under consideration in the application are dependent from the independent claims discussed above and therefore are believed to be allowable over the applied references for at least the same reasons. Because each dependent claim is deemed to define an additional aspect of the invention, however, the individual consideration of each on its own merits is respectfully requested.

CONCLUSION

Therefore, for at least the reasons presented above with respect to all of the pending claims subsequent to entry of this response, Applicants assert that all claims are patentably distinct from all of the art of record. All objections and rejections having been addressed, it is respectfully submitted that this application is in condition for allowance and a Notice to that effect is earnestly solicited. If any points remain in issue that the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Charge Statement: For this application, the Commissioner is hereby authorized to charge any required fees or credit any overpayment to Deposit Account 17-0026.

Respectfully submitted,
QUALCOMM Incorporated
Customer Number: **23696**

Date: June 9, 2008

By: /Ross L. Franks/
Ross L. Franks, Reg. No. 47,233
Tel. No.: (858) 845-1946

QUALCOMM Incorporated
Attn: Patent Department
5775 Morehouse Drive
San Diego, CA 92121-1714
Telephone: (858) 658-5787
Facsimile: (858) 658-2502